



**RE-Source**

European platform for corporate  
renewable energy sourcing



OCTOBER 2021

## **Guarantees of Origin and Corporate Procurement Options**

**Disclaimer:**

This report has been prepared by the RE-Source Platform. It is being furnished to the recipients for general information purposes only. Nothing in it should be interpreted as an offer or recommendation of any products, services or financial products. This report does not constitute investment, legal, tax or any other advice. Recipients should consult with their own financial, legal, tax or other advisors as needed. This report is based on sources believed to be accurate. However, the RE-Source Platform does not warrant the accuracy or completeness of any information contained in this report. The RE-Source Platform assumes no obligation to update any information contained herein. The RE-Source Platform will not be held liable for any direct or indirect damage incurred by the use of the information provided.

**Authors:**

Guy Brindley, WindEurope  
Adam White, RECS International  
Hannah Hunt, RE-Source Platform

We would like to extend a special thanks to the members of the RE-Source Steering Committee and the RECS International board who contributed with their knowledge and experience to this report and reviewed the final document.

The RE-Source Platform was established in June 2017. This report was published in October 2021. The report can be downloaded on the RE-Source Platform's [Renewable Energy Buyers Toolkit](#). Please get in touch with the RE-Source Platform if you have any comments or feedback on the report and its content in order to enrich our ongoing work in this field.

If you would like more information on the contents of this report or on the work of the RE-Source Platform, please contact [info@resource-platform.eu](mailto:info@resource-platform.eu).

**Design:**

Lin Van de Velde, Drukvorm

**RE-Source Founding Associations:**

**WHY HAVE WE WRITTEN THIS REPORT? ..... 5**

**TOWARDS 100,000 CORPORATES ..... 5**

**GLOSSARY OF TERMS..... 6**

**PART 1. GUARANTEES OF ORIGIN ..... 7**

The basics of buying and selling renewable electricity ..... 8

Bundled vs. unbundled GOs ..... 9

Buying renewable electricity around the world ..... 9

Energy certificates for other generation technologies..... 11

GO prices ..... 11

GO market facilitators ..... 12

**PART 2. CORPORATE GO PROCUREMENT OPTIONS..... 13**

The impacts of corporate purchases of GOs..... 14

Unbundled GOs: One-time purchases ..... 17

Unbundled GOs: Supply contracts ..... 19

Green electricity supply ..... 20

Case study 1: Lactalis Group signs up for renewable energy  
for Spanish operations ..... 22

Power purchase agreements (PPAs) ..... 23

Case study 2: Ineos purchases 198 GWh of electricity from Belgian  
offshore wind project ..... 25

**PART 3. GO MARKET OUTLOOK AND POLICY RECOMMENDATIONS ..... 26**

GO market outlook..... 27

Case study 3: 24/7 in Norway – The next step in renewable procurement ... 28

Case study 4: Vattenfall and Microsoft pilot an hourly clean energy  
matching platform..... 29

Case study 5: M-RETS supporting 24/7 carbon-free energy in North America.. 30

Policy recommendations..... 32

# Contents

## Why have we written this report?

The European Union has set ambitious targets for the decarbonisation of the economy, aiming to become the first climate-neutral continent by 2050.

Corporates are increasingly looking at ways in which they can contribute directly to the decarbonisation of the electricity grid and reduce the impact of their own operations on the environment. This is not just to minimise their carbon footprint, but to gain an economic competitive edge and respond to consumers and investors that increasingly value sustainability. The general public also benefits from the purchase of renewable electricity by corporates, as renewable assets entering the electricity grid displace fossil-fuel generated electrons.

For most companies, renewable electricity supply and renewables-based electrification will be the fastest and most efficient path to reducing emissions. In Europe, there are a multitude of business models which allow corporates to purchase renewable electricity, with varying levels of complexity, commitment, and costs, with the use of Guarantees of Origin (GOs) as the means of validating the purchase of the renewable electricity.

The spectrum of business models in this report correlate with a range of impacts on broader electricity sector decarbonisation, from the unbundled GO to the long-term, time-stamped GO supply contract bundled with electricity supply in a power purchase agreement (PPA). The right business model for your company will depend on a large number of factors including your size, experience, risk tolerance, market, etc. We encourage all corporates to try to maximise their impact for their particular set of circumstances.

Your company can make a difference, even if it is small at first. This could be the first step of a journey towards an electricity strategy with major beneficial impacts on the environment and society, and of course to your business.

This report has been written to provide information on European renewable electricity procurement strategies for corporates looking to start making a positive impact on the environment, with a focus on the underlying key to all renewable electricity purchases: the GO. The report has been written in three parts:

- Part 1 outlines **the need and motivation for GOs** including an explanation of the GO market.
- Part 2 describes **the more common procurement models**, from unbundled GOs to long-term PPAs, including analyses of the complexities and potential impacts of each business model.
- Part 3 highlights **future trends in the GO market**, the outlook for corporate sourcing strategies, and policy recommendations required to unlock massive corporate sourcing potential in Europe.

We hope this report helps you on your way to purchasing renewable electricity and contributes to our collective goals in the fight against climate change.

# Towards 100,000 corporates...

It can be difficult for corporates who are new to renewable electricity sourcing, and/or new to the European market, to take the first steps on their procurement journey. There are a number of different risks to consider when entering into any new renewable electricity purchase.

The RE-Source Platform is helping buyers and sellers to work together to simplify transactions and reduce costs in the market whilst encouraging the innovation necessary for the development of the market.

**FIGURE 1**  
Renewable Energy Buyers Toolkit

RE-Source reports and webinars

European Corporate Sourcing Directory

Template Corporate PPA Contract

PPA training courses

This report furthers one of the core objectives of the RE-Source Platform: to raise awareness of the benefits of corporate sourcing and to facilitate business transactions between buyers and sellers by making them faster, easier, and cheaper. We have committed to creating a European Renewable Energy Buyers Toolkit to help navigate the market with increased confidence.<sup>1</sup> This report is part of that Toolkit.

## Additional resources in the Toolkit include:

- *RE-Source reports and webinars* including 'The Introduction to Corporate Sourcing of Renewable Electricity in Europe' which gives an overview of the more common models of renewable energy procurement in Europe.
- The *European Corporate Sourcing Directory* which sets out for each European country which models of corporate sourcing are known to have been used and summarises existing incentives and barriers to corporate sourcing in each market.

- The *Template Corporate PPA Contract* which can be used as a starting point for PPA contract negotiations, co-developed by the European Federation of Energy Traders (EFET) and RE-Source.
- *Corporate PPA training courses* and digital matchmaking platforms provided by Pexapark and other partners.

Corporate sourcing of renewable electricity is a new and constantly evolving market in Europe and across the globe. This report is designed to help corporates understand the benefits, impacts and risks associated with renewable electricity procurement strategies and the certificate scheme underlying them, thereby encouraging more active corporate buyers of renewable electricity in the European market. We hope this will help us to achieve our goal of increasing the 100 companies leading the way in renewable electricity sourcing to the 100,000 we need to make the difference.

**#100to100k**

1. See "[RE-Source Renewable Energy Buyers Toolkit](#)."

# Glossary of terms

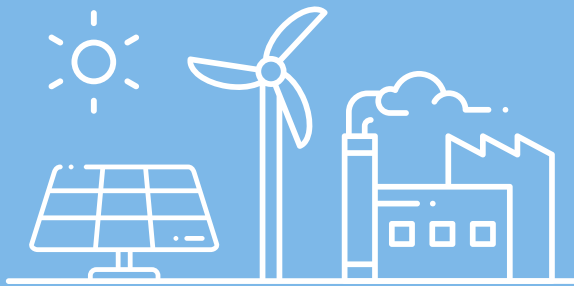
As in any sector, there are many ways of saying the same thing in the renewable energy and power markets sector. This often creates confusion. In the table below, we have specified a set of words and phrases which we have tried to use consistently throughout this report, what we mean by them, and alternative words/phrases that can be used.

**TABLE 1**  
List of key words and phrases

Word/phrase used in report	Meaning	Other common names/phrases
Corporate buyer	The entity purchasing electricity from a renewable power plant	Buyer, company, corporate, consumer, offtaker, purchaser
Corporate sourcing	The procurement of renewable electricity by a corporate buyer. This can be through a PPA or other types of contracts such as leasing or green energy tariffs	Renewable electricity sourcing, renewable electricity procurement
EAC	Energy Attribute Certificate	Renewable Energy Certificate, Guarantee of Origin, GO, REC, I-REC
Energy provider	A utility or similar entity supplying power (electricity, gas) to corporate buyers and other consumers	Utility, supplier
Renewable electricity	Electricity produced from renewable projects	Clean electricity, green electricity
Renewable project	Solar projects, wind projects, etc. which produce electricity from renewable sources	Renewable asset, renewable facility, renewable generator, renewable installation, renewable plant
Seller	The renewable project producing electricity to sell to the buyer	Generator, producer, owner, supplier

# Part 1.

## Guarantees of Origin



# The basics of buying and selling renewable electricity

The Guarantees of Origin (GO) market in Europe - one of three major Energy Attribute Certificate (EAC) markets globally - was created because electricity cannot be physically tracked from a specific producer to a specific consumer in the same way it is possible to do so for other products, e.g., fair trade coffee. This caused a problem for consumers who wanted to buy renewable power. Even if a consumer buys their power from a specific producer, this electricity cannot be packaged and delivered directly to that consumer's facility. Instead, producers inject their electricity into the grid in one location and consumers take the same amount of electricity off the grid in another location.

System operators must maintain a constant balance between injection and consumption of power on the grid. Without this balance, the grid would fail and cause blackouts. When consumers buy power, they are buying the right to remove a given amount of electricity from the grid. Therefore, the only way to track the production and use of a unit of energy, say one megawatt-hour (MWh), along with its attributes, is through a book and claim accounting system. In this way, the European GO market enables participants to:

- Book the attribute certificates when energy is injected into the grid;
- Transfer those attributes to the consumer, sometimes through a supplier; and

- Claim the attributes as proof that they paid for a given type of energy.

At their most basic level, the GO system (and all EAC systems) works as follows:

1. A producer of renewable electricity generates a unit of energy, commonly one MWh;
2. For each MWh of energy injected into the grid, the producer receives a GO from the issuing entity. The GO, an electronic certificate, contains factual information, known as attributes, about that specific unit of electricity. This includes data on the technology used to generate the electricity, where it is located, where it is produced, by whom, etc.;
3. The GO can be traded between market participants through registries with the ultimate aim of selling it to a consumer or retiring it on behalf of the consumer, i.e., end-user;
4. The end-user, or the end-user's representative, consumes the GO by retiring/cancelling it so that it cannot be used again. Without cancellation, there is a risk that one GO could be used twice (known as double counting); and
5. The consumer can then claim to have consumed the electricity represented by the GO.

The GO market is separate from the electricity market. Even though GOs are associated with specific units of renewable electricity, the GO market is not about allocating the electricity; rather, it is a system for allocating the electricity's attributes. Most often these are "renewable attributes" so that electricity consumers can claim the consumption of renewable energy. All consumption must involve the cancellation of the associated GO, as that prevents double issuance or claiming of the attributes of a particular unit of electricity.

## What information is in a GO?

The GO system today functions so that each GO contains information including but not limited to:

- Energy source;
- Start and end dates of production;
- Generator identity, location, type, date of operation, and capacity;
- Whether the GO relates to electricity or heating or cooling;
- Whether the installation benefits from state support;
- Date and country of issue; and
- Unique identification number.



## Bundled vs. unbundled GOs

A GO can be sold either together with the underlying energy, or separately from it. When the GO and the underlying energy are traded in a contract together, it is described as “bundled.” When the GO and underlying energy are traded in separate contracts, it is described as “unbundled.” In either case, the basic principles of buying renewable electricity through the GO system apply.

As will be discussed in Part 2, renewable energy producers can benefit from two revenue streams: 1. the physical energy, and 2. the underlying attributes as represented by GOs. The amount a producer can earn from their GO contract depends mainly on how

much supply there is of the kind of renewable energy they are producing compared to the demand for it in that particular market (see “GO prices” on page 12). In all foreseeable cases, the GO contract revenue stream will be less valuable to the producer than the physical power contract.

GOs provide a means by which corporates can document their renewable energy purchases. And the more renewables consumers buy, the greater the market signal for more renewable electricity and the more incentive, and income, there is for renewable electricity producers to invest in new installations – all of which helps to accelerate the energy transition.



## Buying renewable electricity around the world

### Europe

The GO system and market in Europe is enshrined in EU law and has been developed through a series of Renewable Energy Directives that came into force in 2001, 2009, and 2018. The most recent Renewable Energy Directive (2018/2001/EC) includes Article 19

on Guarantees of Origin, which both expands GO use in the EU and strengthens the GO framework.

The 2018 Renewable Energy Directive requires Member States to put in place mechanisms for the management of GO systems that are compliant with the European CEN – EN 16325 standard. This standard is sometimes

described as a ‘boiled down’ version of the European Energy Certificate System (EECS) rules maintained by the Association of Issuing Bodies (AIB) and which must be adhered to by all AIB members. Membership of the AIB is voluntary, but, currently, all European single market countries (except Poland, Malta, Romania, and Bulgaria (applicant)) are AIB members.

Because AIB Members follow the common practices set out in the EECS rules, GOs (often referred to as EECS-GOs) can be traded between them through a central hub, allowing companies who want to buy and/or sell GOs across the EU to benefit from fewer barriers to trade.<sup>2</sup>

In 2021, the European Commission proposed further changes to the 2018 Renewable Energy Directive, including updates to further strengthen the GO regulatory framework, as part of its broader 'Fit for 55' package, intended to set the European Union on track to reduce emissions by 55% by 2030.

The UK government has confirmed that post-Brexit, i.e., after 1 January 2021, GOs from EU Member States will continue to be accepted. UK energy providers will continue to use Renewable Energy Guarantees of Origin (REGOs) and EU GOs to comply with their fuel mix obligations. In the long term, the UK government has indicated that recognition of GOs from Member States will only continue on a reciprocal basis.

Outside of Europe, two other major EAC schemes exist, with related markets: the North American Renewable Energy Certification (REC) scheme and the International REC Standard scheme.

## North America

EACs in North America are called RECs. As in Europe, one REC is issued for every MWh of electricity produced. U.S. REC markets are governed at the state level; as such, the country has a mix of compliance markets and voluntary markets. Compliance markets can either require consumers to buy a certain percentage of their energy from renewable sources or require energy providers to sell a certain percentage of their energy from renewables. U.S. states with compliance markets set this percentage through Renewable Portfolio Standards (RPS).

In U.S. compliance markets, RECs can also be bought and sold voluntarily, in addition to the requirements of the RPS. These additional sales are referred to as regulatory surplus. Note that this concept is not relevant in Europe, where the sale or purchase of renewables is not currently subject to targets.

## Rest of the World

Outside of Europe and North America, the main EAC schemes adhere to the I-REC Standard. This system is governed by the non-profit International REC Standard Foundation. The Foundation supports local stakeholders and government authorities to implement EAC schemes that are internationally recognised and standardised and that also reflect local or national regulations. Based upon the I-REC Standard and associated Code documents – the blueprints for attribute tracking standards – the Foundation authorises independent issuers to implement robust

and transparent attribute tracking systems, ensuring adherence to best practices for the avoidance of double counting, double certificate issuance and double attribute claiming.

The I-REC Standard ensures all the EACs issued nationally are done so in adherence with all major international standards including the Greenhouse Gas Protocol (GHGP), CDP, RE100, International Organisation for Standardisation (ISO) and others. EACs issued in compliance with the I-REC Standard are available in almost 50 countries across Central and South America, Africa, the Middle East and Asia (including all BRICS countries of Brazil, Russia, India, China and South Africa). The I-REC standard is the youngest of the major EAC schemes and has grown rapidly since its inception in 2014.

## National schemes

Some countries also establish domestic EAC schemes independently of the three main EAC standards set out above. These non-standardised EAC markets are seen in a few locations around the world from T-RECs in Taiwan to Indian RECs in India. Non-standardised EAC markets are often not as well-regulated as standardised markets. This can make it difficult for stakeholders to fully understand what they are purchasing, or to compare their purchases to a standardised EAC. Another issue with non-standardised EAC markets is they often lack a broad understanding of the basic principles of attribute tracking and place requirements on producers or consumers that limit the use or effectiveness of these markets.

2. See "[AIB: Guaranteeing the origin of European energy.](#)"

## Energy certificates for other generation technologies

EAC schemes are mainly used to prove the consumption of renewable energy. However, the use of EACs is not limited to renewables and can document the use of any type of energy – schemes where this happens are called full-disclosure schemes. These systems require making it mandatory for market participants to prove the origin of all their energy consumption through the cancellation of EACs. There are different means of achieving full disclosure:

- Full production disclosure (all production must be certified);

- Full consumption disclosure (certificates must be cancelled for all energy consumption); and
- Full energy provider disclosure (a subtype of full consumption disclosure requiring energy providers to cancel GOs for all end-users' energy use).

It is possible that full disclosure systems could incentivise renewable purchases by increasing consumer awareness and contributing to a more level playing field between renewable and non-renewable

sources. Currently, consumers must go through the process of purchasing and cancelling GOs to prove renewable consumption, but non-renewable consumers face no such requirements. In theory, if all consumers had to purchase energy attributes to prove the origin of their energy consumption, they could become more conscious of where their energy comes from, motivating them to buy renewables. Austria was the first EU Member State to introduce full disclosure, followed by the Netherlands. France is set to start voluntary full disclosure from 2022.

## GO prices

In voluntary markets like Europe, EAC prices are set purely by the supply and demand dynamic. In Europe, the consumption of renewable energy – as documented by the cancellation of GOs - has grown solidly over the last decade. In 2009, 244 terawatt-hours (TWh) worth of renewable energy GOs were cancelled across Europe, growing to 702 TWh in 2018.<sup>3</sup> Nevertheless, European GO supply has tended to outstrip demand - in 2018, total renewable generation in Europe reached 1,244 TWh - indicating much greater use of GOs is possible.<sup>4</sup>

Because the supply of renewable energy has tended to outstrip demand, average prices for European GOs have been relatively low, compared to power prices. During the summer of 2021, prices were quoted around an average of 0.45€/GO for energy generated in 2021 from the main product groups of hydro, wind, solar, and biomass. However, strong market activity in September 2021 has seen these prices almost double, with prices for 2022 and 2023 generation quoted at twice as much – around 1.30€/GO. At present, the GO market is not very transparent, with very little public exchange trading. Most contracts and prices

remain private between the parties involved. The most publicly available prices for European GOs come from national auctions set up to sell GOs on behalf of countries that do not issue them to producers who benefit from public support schemes. The results of the largest and most recent of these auctions, in France in March 2021, saw all available GOs sold at weighted average prices between 0.30€/MWh and 0.52€/MWh.

However, these prices do not tell the whole story. Some specific GO products sell for up to 10 times

3. See "[Development of the Guarantees of Origin Market 2009-2018.](#)"

4. Note that in some markets, GOs are not produced for all equivalent MWh of renewable production; for example, if that project receives government support. However, even taking this into account, it does not change the fact that much greater use of GOs is possible.

the prices seen above. The market for Dutch wind is often noted as being one of the most competitive – Dutch wind was quoted at 2.70€/GO in July 2021 for 2021 supply. The Dutch national rail company has an entirely electric fleet powered by local renewables, and coupled with a strong local demand from other Dutch consumers, GOs for Dutch wind tend to trade at significantly higher prices than the rest of the market. The value of other GOs, such as those included in PPAs or in domestic renewable electricity offers, may be higher or lower and may not be specified separately from the total cost of each MWh of renewable electricity, i.e., power price + GO price. In general, GO prices will rise in Europe as renewable energy demand catches up with GO supply.

Prices in compliance markets, such as those found in several U.S. States, may be significantly higher than in voluntary markets like Europe. This is for two

main reasons. Firstly, the compliance market can drive demand, especially if the target proportion of renewables to be bought or supplied is high enough to provide sufficient demand-side pressure. Secondly, compliance markets can also include a fine, per MWh, for the volume of renewable electricity that a supplier or consumer fails to supply or buy. This fine price then sets an effective compliance price, as it is the price that must be paid if compliance market participants fail to meet their target.

GO prices may be volatile depending on the supply-demand dynamics of the market. For example, in 2018 European GO prices rose to around 2€/GO on the back of low expectations for Nordic hydro generation following a prolonged lack of rain and snow in reservoirs and glaciers. Projections put supply of GOs close to expected demand and so prices rose significantly. However, once it was clear that Nordic

hydro would produce close to normal volumes of power, prices fell again.

RECS International recently published an examination of the supply and demand of certified European renewable electricity and found that: 1) While the overall market for certified renewable energy in Europe has been historically oversupplied, it is now coming into balance; 2) Certified supply only outstrips demand for some renewable energy, most notably hydropower, the oldest renewable energy technology and largest block of installed renewables capacity in Europe; 3) Wind and solar GOs are in strong demand, to the extent that demand for power from these new technologies now outstrips certified supply.<sup>5</sup>

## GO market facilitators

As with all markets, dedicated market facilitators exist in Europe to support GO sales and purchases by providing services such as trading desks, brokerage facilities, or bespoke arrangements tailored to the buyer's or seller's needs. These market facilitators can also be GO account holders who support their clients by managing the cancellation of the GOs they have purchased. Different GO markets have different rules about who can be an account holder and who can

cancel GOs, whether they are a supplier or a market facilitator acting on a client's behalf. The country-specific rules for each AIB member country are set out in 'domain protocols' maintained on the AIB's website.<sup>6</sup> All GO cancellations must be requested by eligible account holders from the system operators.



5. See <https://recs.org/news/new-document-the-supply-demand-of-certified-european-renewable-electricity/>.

6. See "[Domain Protocols](#)."

# Part 2.

## Corporate GO procurement options



# The impacts of corporate purchases of GOs

Corporate procurement of renewable electricity has ramped up significantly throughout Europe as the EU sets out its plans to reduce greenhouse gas emissions by 55% by 2030 and to reach climate neutrality by 2050. Corporate sourcing is set to play a significant role in helping Europe to reach its decarbonisation targets in a cost-competitive manner.

In particular, corporate power purchase agreements (PPAs) have been steadily increasing in annual contracted volumes. Since 2014, more than 15 GW have been announced, including a record 3.5 GW in 2020. But PPAs are not the only way businesses purchase GO-backed renewable electricity. There are a range of different products available; as renewable electricity becomes more mainstream, innovative solutions and new technologies are likely to continue the diversification of options for buyers.

The impacts of such GO purchases by corporate buyers can be categorised broadly into 3 areas: decarbonisation, reputational, and economic.

## Decarbonisation Impact

Variable renewable electricity, i.e., wind and solar, is produced carbon-free with no marginal fuel costs. When new renewable generators are added to the electricity grid, they replace generators with higher marginal fuel costs – in most cases, thermal

generators. As a result of increasing carbon prices from the EU's Emissions Trading System, generators with the highest carbon content in their production (for example, coal and lignite) are generally displaced first, reducing the carbon content of the electricity grid as a whole.

GO purchases by corporate buyers have a wide-ranging impact on renewable energy generators, and thus on grid decarbonisation. As discussed in the previous section, GOs have an intrinsic market value which depends on their supply and demand characteristics. In markets with high demand (for example, in the Netherlands) or low supply (for example, in the Visegrad region of Czechia, Hungary, Poland, and Slovakia),

or both, GOs possess a higher financial value, with renewable projects benefiting from higher revenue streams. GO purchases that remove supply from the market can send an important investment signal to promote further investment in renewable energy.

Importantly, GO purchases bundled with electricity through long-term PPAs provide renewable projects with a guaranteed offtaker and a fixed price (or some level of price certainty) on the future sale of electricity, increasing certainty of revenue and unlocking cheaper capital in the form, for example, of loans from banks. The GO can therefore play a significant part in the facilitation of the construction of new renewable generators.

## Additionality

There is no common industry agreement on the term "additionality." In Europe, it generally refers to the addition of new renewable assets to the grid, or on-site at a company's facilities, which would not have happened in the absence of the renewable energy purchase. For example, a corporate PPA would be considered additional if, as a direct result of the agreement to purchase power from a future generator, the project is able to attract financing and get the go-ahead it would otherwise not necessarily have received.

The strictness of the definition, and the degree to which a corporate requires additionality in their renewable purchases, will help decide the specific GO business model most appropriate to them. For example, a long-term fixed-price agreement with a utility for green electricity supply may enable that utility to invest in new renewable assets, even though that contract has no direct connection with the new renewable investments.

This report makes a clear distinction between additionality and impact. Corporate buyers may make an impactful renewable electricity purchase that does not necessarily fulfil additionality criteria.

## Emissionality

Another emerging indicator of decarbonisation impact of a renewable electricity purchase is “emissionality.” This term represents a consideration of the carbon content of the grid to which a renewable generator is connected. The impact would be greater if a renewable asset is connected to a grid with a high carbon content, rather than one with a higher level of renewables, since the generator would more likely displace an existing asset with a higher carbon footprint. Therefore, the purchase would have a greater decarbonisation impact.

Note that for all the cases below, the decarbonisation impact will be greater when dealing with a higher carbon grid. More specifically, decarbonisation impact will be greater when the marginal generators that are displaced by new renewable generation have high emissions rates.

## Reputational impact

Investors and consumers are becoming ever more conscious of the environmental impact of their choices. Businesses that make clear efforts to reduce their carbon footprint and their environmental impact are likely to benefit from a positive reputational effect and brand enhancement. In fact, as culture and opinions shift, and more and more corporates step up

their efforts to decarbonise, the reputational risk of not acting must be considered.

This reputational risk is threefold. First, there is the risk that competitors gain a competitive edge from their own renewable purchases – enhanced reputations in addition to potentially reduced electricity costs and price volatility.

Second, companies may be seen as not doing enough with their sustainability actions. It is very important that corporates understand the reputational impact that their GO purchase strategy can have, and can communicate their claims clearly with the public.

Third, we have increasingly seen lagging corporates be forced to make changes to their climate and environmental strategies by internal and external pressures, whether their own shareholders or by governments.

Greater reputational impacts can also result when corporates, regardless of their capacity to procure renewable electricity, maximise the positive social and environmental impact of their purchase. For example, to purchase GOs from projects built in urban or rural areas facing historical pollution or unemployment issues, or from projects that incorporate sustainable agriculture practices into their site.



## Economic impact

The economic impact of GO purchases on the corporate buyer will be central to internal decision-making. For this report, economic impact represents levels of financial commitment required, including potential credit support requirements. It also includes risks that might be assumed and managed by the corporate as part of the GO purchase.

Generally speaking, GO purchase strategies with greater decarbonisation and reputational impacts will also have a greater economic impact on the buyer. For example, bundled corporate PPAs have many risks associated with them, risks that have traditionally been handled by utilities, developers, and energy traders. Corporates aiming to sign PPAs

for renewable electricity need to devise a strategy to engage and own these risks, either by developing in-house expertise or entering into partnerships with third parties which can accept some of the risk.<sup>7</sup>

Potential economic impacts can also be offset by potential economic benefits of GO purchases including reduced energy cost volatility, visibility on future liability, and creating a long-term price hedge against future electricity prices.

Corporate business cycles are typically 3-5 years and signing a 10-year plus supply contract is likely to be new to finance, risk, and legal departments, at least at first. The purchase will require executive buy-in and alignment of all these departments in order to successfully enter a long-term purchase agreement.



## Corporate Renewable Procurement Capacity

As mentioned above, the extent to which a company can maximise the impact of their GO purchase strategy will depend on many factors. A wide range of corporates are keen on procuring renewable electricity with GOs. Their capacity to do so in an impactful way will depend on circumstances including their sector, size, location, risk appetite, corporate culture, proportion of electricity costs vs. revenue, and more. While one GO purchase strategy may represent the most that a more limited

corporate can accomplish at a given time, the same purchase would represent minimal effort from a larger, more experienced corporate.

Corporates with a lower ability – and willingness – to enter into complex, long-term renewable electricity contracts will be limited to more simple business models which require a lower degree of understanding, experience, financial commitment, and risk exposure (price, volume, credit, etc.).

Corporates with a higher capacity can make more significant impacts through long-term contracts which enable further investment in renewables, extend the lifetime of existing assets, finance the construction of new assets, facilitate new business models and technologies, and help to accelerate electricity sector decarbonisation.

We encourage all corporates to try to maximise their impact for their particular set of circumstances.

7. For more information, see the “[Risk Mitigation for Corporate Renewable PPAs](#)” report in the RE-Source Renewable Energy Buyers Toolkit.



# Corporate GO procurement options

This section sets out the more common GO procurement options available in Europe, including analyses of the complexities and potential impacts of each business model. The table below summarises the available business models, including variations that can increase the impact of each particular purchase:

Procurement Option	Variations available to increase impact
Unbundled GOs: One-time purchases	Specifying location, technology, project, timing
Unbundled GOs: Supply contracts	
Green electricity supply	Signing bundled contracts and specifying location, technology, project, timing. Some green electricity supply contracts will offer a level of additionality.
Power purchase agreements (PPAs)	Longer contract terms, additionality and emissionality considerations, timing

## Unbundled GOs: One-time purchases

The simplest way for a corporate to validate renewable electricity consumption is through the purchase of unbundled GOs. Each GO represents 1 MWh of renewable electricity and can be cancelled against the energy taken from the grid. It is then possible for the corporate to claim that 1 MWh of electricity was powered by renewable energy.

### Decarbonisation Impact

The simplest and least impactful unbundled GO purchase is a one-time purchase with no preference made on location, technology, project, or timing. In such cases, the marginal benefit is the removal of GOs from the market and the related signal that consumers wish to buy renewable energy. However, the European

Procurement Option	Variations available to increase impact
Unbundled GOs: One-time purchases	Specifying location, technology, project, timing
Unbundled GOs: Supply contracts	
Green electricity supply	Signing bundled contracts and specifying location, technology, project, timing. Some green electricity supply contracts will offer a level of additionality.
Power purchase agreements (PPAs)	Longer contract terms, additionality and emissionality considerations, timing

GO market has historically been oversupplied, primarily due to large supply from Norway's extensive system of hydropower generators. The gap between supply and demand has shown consistent signs of narrowing in recent quarters, particularly in the wind and solar sectors, to the extent that a structural shift

may be taking place. However, a notable proportion of European renewable generators are not currently issued GOs for a range of market and regulatory reasons (see “Policy Recommendations” on page 33). Therefore, increased demand is key to boosting GO markets. Given current market dynamics, the impact of a one-time vanilla GO purchase on the price of Europe-wide GOs would be relatively small. Nevertheless, every GO purchase contributes towards achieving market equilibrium, and prices that can support and sustain an accelerated energy transition.

Where the buyer stipulates more conditions, the decarbonisation impact can be greater. For example, specifying that the GOs must come from a particular country or region, particularly one with high demand or limited supply for GOs, can tighten the dynamics of that specific market and therefore increase the potential impact on prices. The same applies by specifying a specific technology. For example, specifying that the GOs must be solar from Denmark can significantly reduce the available pool of GOs, and increase the impact of that one-time GO purchase. If there is high demand for solar GOs from Denmark, and the value of those GOs increases, this should provide a signal for investors to develop more solar in Denmark. Similarly, in the Netherlands, there is high demand for wind GOs and limited supply. As a result, Dutch wind GOs tend to be more expensive, as mentioned in Part 1.

Corporates also have the option to purchase unbundled GOs from a specific renewable asset. This

creates a direct link to the renewable generation and generates specific revenue for the project owner.

Finally, work is underway to create a system whereby a GO can be time-stamped down to the shortest time period in which energy trades in the market (at least hourly) (see Part 3). This would be an important development to allow corporates to cover their demand on an hourly basis with renewable electricity. The outcome would be that GOs produced when wind or solar resources are low would be under greater demand, and therefore carry a higher financial value. This would provide incentives for the development of technologies, such as storage, to take advantage of higher price periods, or demand-response which would help reduce the cost for buyers by reducing their electricity usage when renewable electricity supply is low and GO prices are high.

### Reputational impact

The reputational impact of one-time unbundled GO purchases is subjective and will depend on many factors, including the type of purchase, the availability of resources in the country and the attitude and experience of the local and regional media. For a small, inexperienced corporate with a low corporate renewable procurement capacity, they might experience positive reputational effects, particularly if they can associate their purchase with a renewable asset in the vicinity of their electricity demand.

At the other end of the spectrum, for a large, experienced corporate, there is a reputational risk, particularly if the purchase is done in a market where a more impactful option is available. A one-time unbundled GO purchase could make sense for these companies in the case that they need to cover a small percentage of residual electricity consumption not covered by another purchasing strategy such as an existing bundled PPA (which are negotiated based on expected demand). Clear communication of the purchase, including the potential impacts, will be important.

### Economic impact

The main benefit of simple unbundled GO purchases is that there is no long-term commitment required and therefore no price risk and zero future liability. A corporate can essentially cover their electricity usage from renewable energy with ad-hoc purchases. This makes this strategy particularly useful for corporates that lack existing resources to pursue more impactful strategies.

Furthermore, unbundled GOs are an essential tool for corporates for smoothing over any gaps in obligations arising from the variable nature of other renewable purchases, avoiding damaging the reputation of the corporate’s overall renewable purchase program.

## Unbundled GOs: Supply contracts

A corporate can have a greater impact with their unbundled GO purchase by entering into a medium- to long-term contract for the future supply of GOs. By committing to a schedule of future purchases at a fixed-price, the corporate can cover longer-term renewable energy claims, make a stronger financial commitment, and provide a stronger demand signal to the market.

### Decarbonisation impact

The additional decarbonisation impact from a supply contract, compared to an ad hoc GO purchase, comes from absorbing future supply, potentially raising future GO market prices and sending a stronger investment signal.

As with the ad hoc purchases, the addition of more specific features such as location, technology, project, or timing, can have a more profound effect on GO market prices, particularly if the specifications are in areas with limited supply. Larger price impacts in theory lead to stronger investment signals.

In addition, if the supply contract stipulates a specific project, that project directly benefits from a guaranteed buyer of the certificates and a guaranteed revenue stream for the duration of the contract, reducing revenue volatility and risk for the project. Of course, the corporate buyer also benefits from reduced volatility and price visibility on its future GO purchases.

Procurement Option	Variations available to increase impact
Unbundled GOs: One-time purchases	Specifying location, technology, project, timing
Unbundled GOs: Supply contracts	
Green electricity supply	Signing bundled contracts and specifying location, technology, project, timing. Some green electricity supply contracts will offer a level of additionality.
Power purchase agreements (PPAs)	Longer contract terms, additionality and emissionality considerations, timing

Long-term contracts, i.e., longer than 5-7 years, provide additional GO price and revenue stability to projects compared to shorter contracts and provide clearer long-term market signals. A long-term purchase of GOs from a specific project with specific time of production would provide the greatest overall impact.

### Reputational impact

The consideration of the reputational impact is similar to ad hoc purchases. Depending on the corporate's ability and willingness to make impactful renewable electricity purchases, the contracted GO supply may result in an enhancement of brand reputation. But again, if the corporate has a high degree of expertise and resources, there could be a risk that the purchase is perceived in a less positive light. The more specific the supply contract, the more likely it will be received positively.

GO supply contracts can be useful to cover residual demand not covered by other procurement contracts, and in which case, should not carry a risk of negative reputational impacts. However, a clear understanding of the impact of the purchase strategy and communication to stakeholders will be important to mitigate against potential reputation impacts.

### Economic impact

The economic impact of an unbundled GO supply contract will be greater than a one-time purchase as it involves an obligation to purchase GOs in the future, i.e., a liability. However, prevailing average GO prices are low compared with average electricity prices, and therefore the financial commitment should not be too burdensome and this strategy should be achievable to some extent by the majority of corporates.

## Green electricity supply

Corporates also have the option to enter into green electricity supply contracts with energy providers, i.e., utilities, for their GO purchase. These contracts can take a broad range of forms, from a short-term electricity supply backed by vanilla GOs, to a long-term fixed-price bundled contract, with the GOs and renewable power connected to one or more specific assets. At this end of the spectrum, there is little difference between green electricity supply and a corporate PPA. In these cases, the main difference is the negotiation of the contract occurs between the buyer and the energy provider, and not between the buyer and the renewable generator itself.

The main benefit to the corporate buyer of choosing a green electricity supply contract is the ability to mitigate a number of risks associated with traditional corporate PPAs.<sup>8</sup> The corporate can still negotiate a bespoke contract with their energy provider which suits their risk appetite, but in general, the negotiation

process can be more simple and less time-consuming than a traditional corporate PPA negotiation between the buyer and the renewable generator.

### Decarbonisation impact

The decarbonisation impact will depend on how much the green electricity supply supports the energy provider to invest further in renewable assets - or other technologies related to electricity grid development to facilitate the deployment of renewable electricity.

At the lower end of the impact spectrum, a short-term supply contract backed by vanilla GOs may provide the utility with a minor increase in revenue. Since they will be accepting most of the risk associated with the contract - and are best placed to do so, given their experience and resources - the energy provider will also charge a premium for the service.

As with all types of green electricity supply, the decarbonisation impact depends not just on the ability of the energy provider to invest further in renewables, but also their willingness to do so. Corporate buyers should be aware of the actual impact that their agreement will have on the energy provider's practices and investment decisions.

At the higher end of the impact spectrum, green electricity supply can have similar impacts to a corporate PPA. The buyer's long-term contract can offer the utility a fixed revenue stream, for which they can supply energy from specific generators, including new build projects which give buyers some degree of additionality.

It has become more common recently for corporates in Europe to sign long-term bundled green electricity supply contracts with specific renewable generators, essentially a PPA, and at the same time top up their residual demand with an additional supply contract provided by the same utility. This model is likely to increase in popularity given the ability of energy providers to provide this direct link to a renewable asset, and to cover the rest of the consumption from their portfolio of renewable assets, allowing buyers a one-stop shop for their renewable energy purchases, and in some cases, satisfying 24/7 matching requirements, as well (see Part 3).

Procurement Option	Variations available to increase impact
Unbundled GOs: One-time purchases	Specifying location, technology, project, timing
Unbundled GOs: Supply contracts	
Green electricity supply	Signing bundled contracts and specifying location, technology, project, timing. Some green electricity supply contracts will offer a level of additionality.
Power purchase agreements (PPAs)	Longer contract terms, additionality and emissionality considerations, timing

8. For more information, see the "Risk Mitigation for Corporate Renewable PPAs" report in the RE-Source Renewable Energy Buyers Toolkit.

Green electricity supply can have other decarbonisation benefits besides the support for new renewable additions. Across Europe, as renewable generators exit support schemes, these generators are looking for buyers to guarantee their offtake and cover continuing operations and maintenance costs. Energy providers can contract with these operating assets, helping to extend their lifetime and provide renewable electricity to buyers looking to meet their decarbonisation objectives. This satisfies impact criteria for many buyers, as it keeps a fully appreciated asset operating and providing renewable electricity to the grid at low cost.

### Reputational impact

Corporates can achieve a positive reputational impact with green electricity supply, particularly when it can be marketed as a PPA, i.e., they can show a direct connection with a wind farm or solar park that facilitates the construction, or lifetime extension, of the asset in question.

However, there are reputational risks associated with the communication of the contracts, given the large range of contract types and the complicated (and possibly confusing) nature of the deals. Partnerships are important and often buyers will use one energy provider for more than one of their deals. It is important that counterparties have an understanding of their own cultures and aspirations.

Accusations of greenwashing can have negative reputational impacts. For example, if a buyer believes and communicates they are purchasing 100% renewable energy, but their utility neither owns nor invests in renewables and simply covers the electricity with vanilla GOs, then the decarbonisation impact would be limited. This has been known to be the case in the past and highlights the need for buyer due diligence to understand the energy provider and their products.

### Economic impact

The economic impact again depends on the green electricity supply contract and the degree to which the corporate is willing to invest in the contract. A long-term fixed-price contract can have a significant economic impact on a corporate, and procurement managers will need to engage with many internal stakeholders for sign-off, including finance, legal, and risk departments.

Since green electricity supply contracts tend to allocate more risk to parties better equipped to manage those risks, the economic impact may be less in that respect. And if it is a short-term agreement with the addition of unbundled GOs to cover supply, there may not be much of an economic impact at all, just a premium on a standard supply contract. As we have tried to make clear in this report, this sort of contract may not carry the greatest impact in any sense, but it may be the most positive step a corporate can take in a given time and situation.

## Lactalis Group signs up for renewable energy for Spanish operations

### Case study 1



**Companies:**  
Lactalis Group, Engie Spain

**Location:**  
Spain

**Description:**

From their portfolio of renewable assets in Spain, Engie have committed to supplying the Lactalis Group's factories, warehouses and offices with renewable electricity for 9 years from 1 January 2021. The long-term nature of the deal facilitates further investment, construction and maintenance of new renewable energy projects in Spain.

The Lactalis Group is also able to cover at least 50% of their electricity demand in Spain with the renewable electricity, offsetting their carbon emissions by 10% or around 26,950 tons of CO<sub>2</sub> per year.

## Power purchase agreements (PPAs)

Procurement Option	Variations available to increase impact
Unbundled GOs: One-time purchases	Specifying location, technology, project, timing
Unbundled GOs: Supply contracts	
Green electricity supply	Signing bundled contracts and specifying location, technology, project, timing. Some green electricity supply contracts will offer a level of additionality.
Power purchase agreements (PPAs)	Longer contract terms, additionality and emissionality considerations, timing

A corporate PPA in its purest form is a long-term contractual agreement between a corporate buyer and a renewable generator for renewable electricity supply backed by GOs. Corporate PPAs are generally structured as either:<sup>9</sup>

- **Physical PPAs:** A contract that provides physical power delivery with both parties located on the same national or regional grid. A third-party intermediary will often be involved to deliver the generator's energy, as well as any residual physical energy demand through a sleeving arrangement.
- **Virtual PPAs:** A financial contract in which the price for the underlying electricity is settled through a Contract-for-Difference (CFD) structure. The only physical exchange is the transfer of the GOs. There is no physical transmission of energy between the buyer and the renewable generator. The renewable energy is delivered to the generator's grid independent of the energy

used by the corporate buyer. Virtual PPAs help to facilitate pan-European cross-border PPAs where the buyer and supplier are in different countries.

### PPAs with new assets

If a corporate has the capability and willingness to enter into a long-term fixed-price PPA (usually at least 10 years) then that agreement can facilitate the construction of a new, or repowered, renewable asset. The guaranteed offtake and price certainty allows the renewable project to predict revenues with greater certainty. In addition, if the buyer is sufficiently creditworthy or can provide sufficient credit guarantees, the project is able to secure better financing terms, e.g., more competitive interest rates, longer tenors, additional capital, etc.

For all PPA structures, the generator's GOs are bundled with the renewable electricity supply to verify renewable consumption by the corporate buyer, and their financial value is accounted for in the PPA price the counterparties agree to in the negotiation.

Corporate PPAs are currently considered the gold standard of corporate renewable electricity procurement but there is still a range of types of PPAs with varying impacts. It is convenient to separate PPAs into two broad categories: PPAs with new assets and Lifetime Extension PPAs.

### Lifetime extension PPAs

There is a percentage of the European renewable fleet which was constructed under various renewable support schemes. In the next 5-10 years, these assets will be exiting their support and will be looking for offtakers to continue operation. With construction debt fully paid off, the agreed price must cover operations and maintenance costs only (though these costs are likely to be higher than with new assets). Since there is no need to satisfy more stringent credit thresholds and tenors required by banks for lending to new projects, this type of PPA offers an excellent opportunity to corporates who wish to sign PPAs but are unable to commit to longer tenors or do not have sufficient creditworthiness for PPAs with new assets.

9. For more information on PPA types, see the "[Introduction to Corporate Sourcing of Renewable Electricity in Europe](#)" report in the RE-Source Renewable Energy Buyers Toolkit.

## Decarbonisation impact

Corporate PPAs with new wind and solar projects lead to new renewable generation on the electricity grid, most often replacing fossil fuel powered generators. Therefore, there is a clear decarbonisation impact of these PPAs. Some companies are increasingly considering the emissionality of the specific project(s) with which they sign PPAs. As mentioned above, decarbonisation impact can be greater if a renewable asset is connected to a grid with a higher carbon content, rather than one with a higher level of renewables, since the generator would more likely displace an existing marginal asset with a higher carbon footprint.

Lifetime extension PPAs allow the continued production of clean, renewable electricity without the need to decommission existing assets. Generally, it is a benefit to extend the lifetime of existing renewable assets since there are only operations and maintenance costs required to keep the asset running. However, it should also be understood that technology has progressed a long way in a short amount of time. Given the increase in installed capacity required in Europe to meet decarbonisation targets, it may also make sense in some circumstances to repower the existing renewable asset, replacing older generators with more powerful, efficient generators at the same site.

For all PPA types, increased impact may also be possible as corporates structure their contracts to support 24/7 matching of production and consumption (see Part 3).

## Reputational impact

The GOs that are bundled into corporate PPAs prove a direct link between the energy consumption by the corporate and clean energy generation, which can have significant and positive reputational impacts.

PPAs which facilitate the construction of new renewable generators tend to garner the most interest in the media as it is simple to understand and there are clear benefits to the construction of new renewable assets.

## Economic impact

The main advantages of a lifetime extension PPA are the reduced reliance on the creditworthiness of the offtaker, and the greater flexibility in contract term length. These differences greatly simplify the negotiation process, increasing efficiency and speed. They also open up a whole pool of potential corporate offtakers interested in corporate PPAs but unable to commit to the demands of a long-term PPA with new assets.

The economic impact of entering into a long-term PPA can be significant. Large corporates often develop their own energy trading departments in order to carry out negotiations with counterparties and manage their PPA portfolio. Understanding electricity markets and trading is not a traditional necessity for corporates, but the knowledge and experience from an in-house team of experts can greatly increase the efficiency of the negotiation process and their contracting

power. Negotiations typically take upwards of 6-12 months with costly associated professional fees. We see partnerships as being key to be facilitating more efficient negotiations and contracting.

There are also economic impacts which must be considered carefully when entering into a contract to purchase a commodity over a long time period. Corporates are generally not used to this. A corporate will often contract a PPA for a small proportion of their initial demand and gradually increase their renewable electricity coverage by contracting for separate tranches, thereby diversifying risks over a portfolio of contracts.

Of course, there are benefits from signing long-term fixed-price agreements. Indeed, in a recent corporate buyer survey, 92% of corporates indicated they were purchasing renewable electricity for the economic benefits.<sup>10</sup> Renewables are cost-competitive in most geographies in Europe, and when companies are able to commit to a fixed price over the contract term, this can prove to be a major benefit. With carbon prices increasing, there could be justification in assuming there will be corresponding future electricity price increases. However, this is in no way certain with large increases in renewable power, one can argue that future prices may decrease. Either way, it is fair to say that future prices are uncertain, and the ability to lock in prices today removes volatility of electricity costs, which can be a significant benefit for corporates.

10. See "[BayWa r.e. Energy Report 2019.](#)"



## Ineos purchases 198 GWh of electricity from Belgian offshore wind project

### Case study 2



Location:  
Belgium

#### Description:

The chemicals company Ineos entered into a 10-year PPA for the output of the Northwester 2 offshore wind farm in the Belgian North Sea from January 2021. Over the duration of the contract, it is expected the wind farm will deliver 198 GWh of energy which is approximately 25% of the output from the wind farm and is equivalent to a capacity of 55 MW.

RWE Supply & Trading GmbH purchased all the power produced from Parkwind's Northwester 2 early in 2019 with the goal of selling the electricity and GOs to large industrials and municipalities.

The deal with Ineos allows the chemical company to reduce its carbon emissions in Belgium by 745,000 tonnes.

#### Companies:

Ineos, RWE, Parkwind

# Part 3.

## GO market outlook and policy recommendations



# GO market outlook

As more and more companies purchase renewable electricity across Europe, GOs will continue to function as the main framework for certifying and verifying renewable consumption. Procurement solutions and technologies are likely to continue to diversify for buyers.

## Hourly matching GOs

Looking to the next decade, several companies are seeking to match their demand with clean electricity production on a more granular basis. In some cases, they are moving toward hourly matching, e.g., 24/7. The potential benefits of doing so include increasing transparency of corporate sustainability claims, increasing renewables investment, higher decarbonisation impact, facilitating new business models and technologies, and more.<sup>11</sup>

Corporate buyers and supporting market participants (utilities, renewable generators, technology providers) are taking a range of approaches to more granular matching strategies, drawing on different technology portfolios, impact criteria, and business models. For example, some companies have set 100% renewable electricity goals on an annual basis and complement that goal with an hourly matched carbon-free target.



In any scenario, the underlying GO framework will need to function so that it can facilitate the issuance and cancellation of GOs at the level of granularity requested by the buyer. Currently in Europe, GO issuance and reporting typically happens on an annual or monthly basis. European demonstration projects

with hourly matching are being launched today and are detailed in the EnergyTag initiative's white paper.<sup>12</sup> Any efforts like these should be seen as voluntary, or as an option to increase the impact of existing GO purchases. They should also be compatible with and not undermine existing GO frameworks.

11. For more information, see "A Timely Match: Accelerating power system decarbonisation by moving towards 24/7 matching in corporate renewable electricity (RES-E) and market integration" in the RE-Source Renewable Energy Buyers Toolkit.

12. See "EnergyTag and granular energy certificates: Accelerating the transition to 24/7 clean power."

## 24/7 in Norway – The next step in renewable procurement

### Case study 3



Location:  
Norway

#### Description:

Through this demonstration project, Unicorn, Statkraft, Tibber, and Statnett aim to demonstrate the feasibility of issuing GOs with hourly granularity, matching them to the consumption profile of a chosen consumer and disclosing the renewable consumption.

The demonstration project will prove that:

- Hourly issuance and matching can be achieved within the EECS GO scheme;
- Hourly GOs can work within the existing IT systems used by issuing bodies and the AIB hub.

Statkraft worked with Tibber to create a hierarchy of demand, with Statkraft first delivering local production, followed by neighbouring price areas, backed up by Norwegian hydro assets. The project utilizes the Statkraft asset portfolio in Norway to ensure renewables are being consumed at all hours.

#### Companies:

Statkraft AS, Tibber AS, Unicorn, Statnett

## Vattenfall and Microsoft pilot an hourly clean energy matching platform

### Case study 4



Location:  
Sweden

#### Description:

Vattenfall and Microsoft in Sweden successfully piloted an hourly clean energy matching platform that covers Microsoft's datacenters in Sweden.

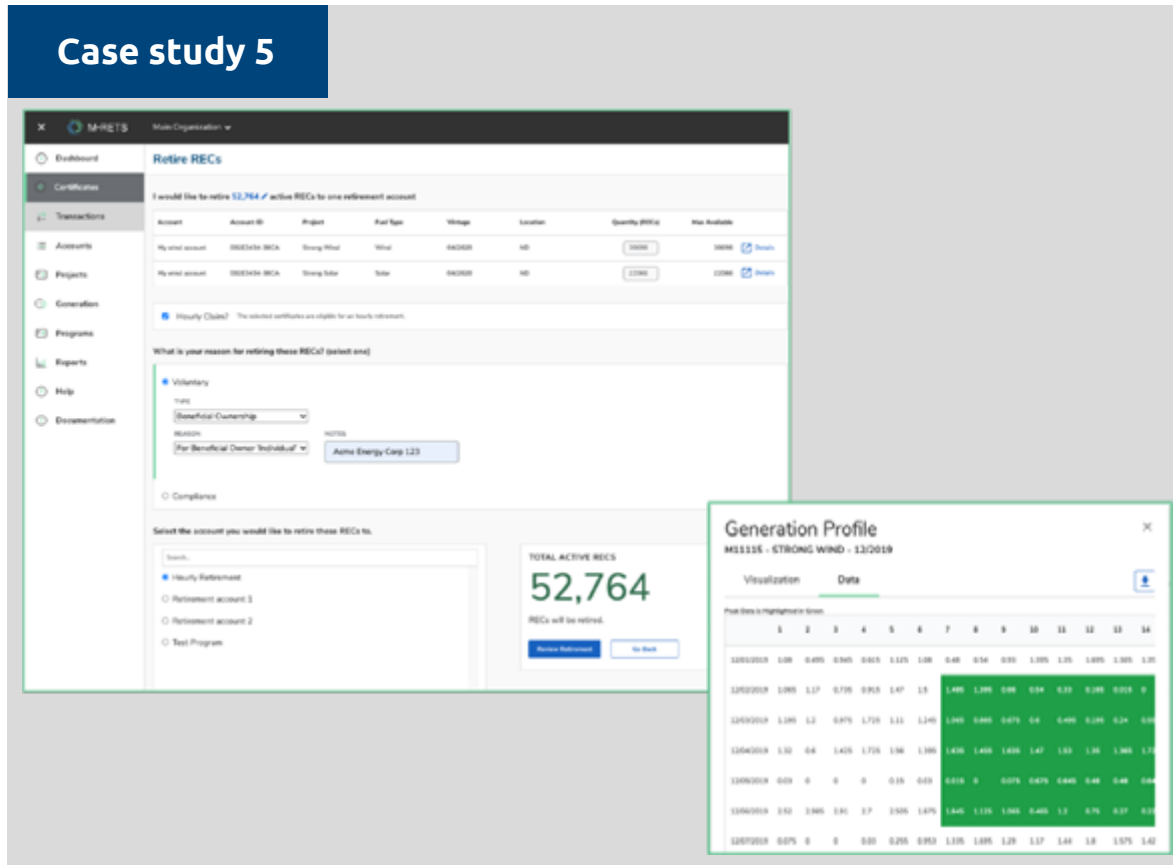
For this project, Vattenfall used Microsoft Azure to build and deliver a solution that allows hourly matching of clean energy generation with demand for Microsoft and other Vattenfall customers. Clean energy generation and energy consumption are measured hourly and matched hourly on the Azure solution, which enables transparency by providing increased information about the hourly source of energy associated with each MWh of consumption.

#### Companies:

Microsoft, Vattenfall

## M-RETS supporting 24/7 carbon-free energy in North America

### Case study 5



Location:  
Midwestern U.S.

#### Description:

To support 24/7 carbon-free energy initiatives, M-RETS, a renewable energy tracking platform, facilitated the first-ever hourly REC claim when Google finalised an hourly REC retirement in January 2021. This is the first step in building out the data available in existing environmental commodity markets like RECs to help facilitate and quantify efforts toward economy-wide decarbonisation in both voluntary and compliance markets.

As part of Phase 1, M-RETS accomplished the following:

1. Developed technical tools to collect hourly data beginning in January 2019. At publication, M-RETS has more than 60 million MWh of hourly generation data and growing.
2. Created an accessible user interface to both view hourly generation data in the system and download that data or access it via an application programming interface.
3. Built advanced hourly reporting tools that allow users to aggregate hourly generation from multiple generators over time.
4. Built a retirement process that integrates hourly generation data into the process when a user retires a complete batch of RECs (i.e., not subdivided after issuance).

Companies:  
Google, M-RETS

## GOs for carbon accounting

The GO system today functions so that each certificate issued for renewable generation contains facts about that specific MWh. Article 19 of the existing Renewable Energy Directive states that each GO should contain information including but not limited to:

- Energy source;
- Start and end dates of production;
- Generator identity, location, type, date of operation, and capacity;
- Whether the GO relates to electricity or heating or cooling;
- Whether the installation benefits from state support;
- Date and country of issue; and
- Unique identification number.

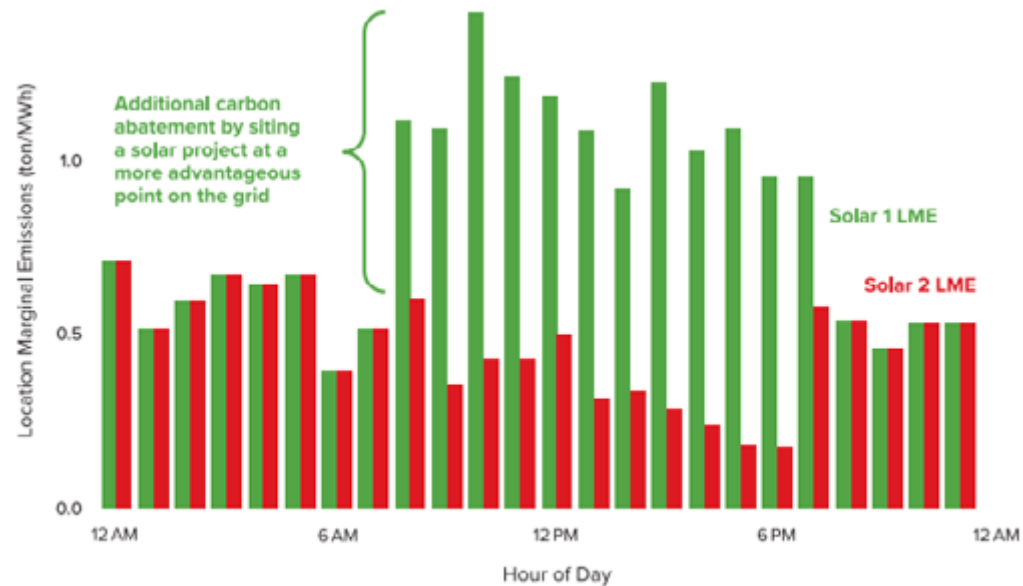
As corporate buyers increasingly consider the emissions impacts associated with their GO purchases, one future consideration will be whether, and to what extent, the GO framework in Europe will evolve so that GO issuers begin to include more information in the certificates that would be useful for more detailed and accurate carbon accounting. Potential data points could include grid mix and marginal emissions rates at the time and location of production, as well as actual marginal emissions for the renewable generator.<sup>13</sup> Potential benefits of having this information include helping companies achieve their broader decarbonisation goals as well as helping them to better evaluate renewable electricity purchases based on decarbonisation impact.

While access to historical grid mix is available now on the ENTSO-E transparency platform, access to validated, location-specific marginal emissions data is still extremely limited in Europe. Potential solutions are being explored to calculate this data and make it available to buyers. A 2021 RESurety and Brattle Group white paper presents one potential approach to calculating marginal emissions impact based on the timing and location of renewable generation.<sup>14</sup> Their analysis shows a real world example where transmission constraints in the U.S. state of Texas can cause one solar

project to have double the emissions impact of a nearly identical project (with a nearly identical generation profile) located less than 60 kilometres away from each other.

The locational marginal emissions (LME) tool, with an initial release focused on Texas, provides information on carbon abatement value of specific renewable projects. This information could enable corporate buyers to focus on sourcing renewable energy from projects with the largest grid decarbonisation impact.

**FIGURE 2**  
 LME of Two Solar Projects in Texas Across an Example Day



Notes: Figure shows hourly LMEs for two solar facilities on June 13, 2018. Both facilities are located in ERCOT's Far West, on either side of a binding transmission constraint.

13. Marginal emissions rates are defined here as the amount of carbon emissions displaced by a MWh of renewable generation injected into the grid at a specific location and during a specific time period.

14. See "Locational Marginal Emissions: A Force Multiplier for the Carbon Impact of Clean Energy Programs."

## Policy recommendations

A well-functioning policy and regulatory framework for GOs in Europe will be critical to corporate sourcing efforts. The framework should be stable and predictable for businesses, and continue to improve over time, particularly as corporate energy buyers and other consumers are increasingly seeking more detailed information on the origin of their energy. All updates to the policy and regulatory framework should also be compatible with and enable the transition to a fully decarbonised, resilient, and flexible electricity grid.

**Member States should issue GOs to all renewable electricity producers, irrespective of whether the renewable energy projects are installed behind-the-meter or receive state support.**

Some Member States retain GOs from renewable energy projects benefiting from State Aid because they fear the projects could receive double compensation. This breaks the link between renewable energy producers and consumers and prevents PPAs from being signed. Article 19 of the existing Renewable Energy Directive states that the price of the GOs needs to be factored in the level of support to avoid any potential double compensation. GOs are also not issued for behind-the-meter self-consumption in some Member States, only for the electricity that it is injected into the grid. This creates further challenges for corporates as they may want to make claims against renewable energy goals.

In July 2021, the European Commission proposed revisions to the Renewable Energy Directive in its 'Fit for 55' package to address these issues. Proposed amendments will require Member States to issue GOs to all renewable electricity producers. For example, countries would no longer be able to retain GOs from assets receiving financial state support.

**GOs should contain an increased level of information in order to empower producers to market their renewable electricity, enable more accurate matching of renewable energy supply and demand, and enable more accurate identification of the emissions benefit of particular renewable projects.**

Transparent information on the timing of GO generation should be provided at a more granular level than simply annually to support corporate consumers willing to attest to the matching of supply and demand. Member States should "time-stamp" the GOs issued to producers to know the precise time at which the underlying unit of energy (1 MWh) was produced. The current Renewable Energy Directive allows issuing bodies to define GO production periods, and most use annual or monthly periods – not the day, hour, or 15-minute balancing period. As such, time-stamping would be compatible with and would not undermine existing GO frameworks. It should allow corporate buyers to continue validating their renewable energy consumption on an annual or monthly basis, if they

prefer. The GO framework should function so that it can facilitate the issuance and cancellation of GOs at the level of granularity requested by the corporate buyer.

In addition, as corporate buyers increasingly consider the emissionality associated with their GO purchases, adding information useful for carbon accounting purposes could help corporate buyers to make more impactful investments based on potential decarbonisation impact.

**Member States should harmonise environmental attributes on a single system across Europe.**

This will reduce complications for businesses operating across multiple countries and facilitate the development of liquid markets. Moreover, to achieve a well-functioning framework for GOs, rules to guarantee the traceability and ensure issuance of GOs to all renewable electricity producers should follow a consistent approach across all Member States. Arbitrary rules for the retirements of GOs, such as requirements that only allow suppliers to retire GOs, or that GOs must be retired within the same month as they are generated, should be eliminated.





**RE-Source**

European platform for corporate  
renewable energy sourcing

<https://resource-platform.eu/>